

What is claimed is:

1. An apparatus for counting the rotation frequency of a numeral wheel of a meter for a remote meter reading system, which is applied to a meter in which the numeral value of a numeral wheel counter formed with a plurality of numeral wheels accumulatively increases in proportion to the usage amount of a supply, the apparatus comprising:

a light reflection means which is attached on part of the outer surface of any one numeral wheel of the numeral wheel counter so that a surface of the light reflection means having a high reflection rate is directed to the outside, and which reflects an incident infrared ray while rotating with the numeral wheel;

a light sensor unit in which two independent holes are formed on one side of a case made of an opaque material, and an infrared ray emitter, which receives a driving pulse signal and intermittently emits an infrared ray, is disposed inside a first hole and an infrared ray sensor, which outputs an electric signal in proportion to the light amount of an infrared ray flowing into a second hole, is disposed inside the second hole;

a light sensor fixing housing which has a structure in which the housing is detachably coupled with the meter while the light sensor unit is mounted and fixed inside the housing, and in an assembled state of the housing, the first hole and the second holes are located above a rotation path of the numeral wheel, on which the light reflection means is attached, and at least a part of the housing, covering the numeral wheel counter and a part on which meter product information is written, is transparent so as to be read from the outside, and has

an infrared ray blocking function to block external infrared rays flowing into the inside;

a micom which calculates the usage amount of the supply by counting the output electric signal from the infrared ray sensor to recognize the rotation frequency of the numeral wheel ; and

a power supply means which supplies power needed for the light sensor unit and the micom by using a battery power source, and in particular, provides the infrared ray emitter with the driving pulse signal.

2. An apparatus for counting the rotation frequency of a numeral wheel of a meter for a remote meter reading system, which is applied to a meter in which the number value of a numeral wheel counter formed with a plurality of numeral wheels accumulatively increases in proportion to the usage amount of a supply, the apparatus comprising:

a light reflection means which is attached on part of the outer surface of a predetermined numeral wheel of the numeral wheel counter so that a surface of the light reflection means having a high reflection rate is directed to the outside, and which reflects an incident infrared ray while rotating with the numeral wheel;

a light sensor unit in which two independent holes are formed on one side of a case made of an opaque material, and an infrared ray emitter, which receives a driving pulse signal and intermittently emits an infrared ray, is disposed inside a first hole and an infrared ray sensor, which outputs an electric signal in proportion to the light amount of an infrared ray flowing into a second

hole, is disposed inside the second hole, and the light sensor unit is inserted into an aperture formed on a part on the top side surface or the bottom side surface of a meter cover, said part corresponding to the location of the numeral wheel, on which the light reflection means is attached;

5           a light blocking cover which prevents external light from entering into a space between the light sensor unit and the numeral wheel on which the light reflection means is attached;

          a micom which calculates the usage amount of the supply by counting the output electric signal from the infrared ray sensor to recognize the rotation  
10 frequency of the numeral wheel; and

          a power supply means which supplies power needed for the light sensor unit and the micom by using a battery power source, and in particular, provides the infrared ray emitter with the driving pulse signal.

15   3.       The apparatus of claim 1, wherein the housing is made from a molding material obtained by mixing a transparent plastic resin with infrared ray blocking powder by injection molding so as to have the infrared ray blocking function.

4.       The apparatus of claim 1, wherein the housing is made from a  
20 transparent plastic resin and coated with an infrared ray blocking material or attached with an infrared ray film on the outer surface or inner surface of the housing so as to have the infrared ray blocking function.

5. The apparatus of claim 1, wherein by attaching one of two polarization films whose polarization directions are perpendicular to each other, on the surface of the transparent part of the housing and attaching the other on the entrance of the second hole, in which the infrared ray sensor is disposed, the housing is made to have the infrared ray blocking function.
6. The apparatus of any one of claims 3 through 5, wherein the housing is made to be opaque except at least the part covering the numeral wheel counter.
7. The apparatus of any one of claims 1 and 2, wherein the light sensor unit further comprises a filter unit which allows only infrared rays in a wavelength output by the light emitter to pass through at the entrance of the second hole, in which the infrared ray sensor is disposed.
8. The apparatus of any one of claims 1 and 2, wherein an infrared ray absorption material is coated or an infrared ray film is attached on at least the remaining section, on which the light reflection means is not attached, of the numeral wheel, on which the light reflection means is attached.
9. The apparatus of any one of claims 1 and 2, wherein the first hole and the second hole of the light sensor unit are formed to be slanted so that the light reflection means becomes a vertex.

10. The apparatus of any one of claims 1 and 2, wherein each of the inside walls of the first and second holes is made to be a light reflection film.

11. The apparatus of any one of claims 1 and 2, wherein the duty ratio of the driving pulse signal is 1/100 or less.

12. The apparatus of any one of claims 1 and 2, wherein the driving pulse signal has a cycle not exceeding 250ms, a duration time longer than a response time of the infrared ray sensor, and a duty ratio not exceeding 1/100.

13. The apparatus of claim 2, wherein the infrared ray blocking function is provided by at least any one of a first method of coating an infrared ray blocking material on the transparent part of a cover of the meter; a second method of attaching an infrared ray blocking film on the transparent part of the cover of the meter; a third method of injection-molding the cover by using a mixture of an infrared ray blocking material and the raw material of the cover; and a fourth method for attaching one of two polarization films whose polarization directions are perpendicular to each other, on the transparent part of the cover of the meter and attaching the other on the entrance of the second hole, in which the infrared ray sensor is disposed.

14. The apparatus of any one of claims 1 and 2, wherein when the meter is installed, an initial value of the meter is reflected in the micom.